

# Music Notation Software: a Composer’s Best Enemy?

FRANCIS KAYALI

*Resonance Interdisciplinary Music Journal*, Spring 2009

University of Southern California

## CONTENTS:

Introduction.....	1
I. Two Approaches.....	2
II. Issues with MEPS .....	5
1. A brief look at the advantages of MEPS.....	5
2. Hardware Issues .....	6
3. Notation Issues.....	7
4. Playback issues .....	9
5. Other technical issues .....	13
6. Aesthetic Risks.....	15
7. Stigma? .....	17
III. Defensive Composing Strategies .....	18
IV. Comforting Perspectives.....	21

## Introduction

Music notation software programs such as Finale and Sibelius were first released in the early 1990s and were quickly adopted by composers of concert music. While marketed primarily as a means of printing professional-looking scores, these programs also come with compositional utilities (e.g., playback, cut-and-paste, and transpose).

This paper identifies a change in the way composers of different generations approach the use of music engraving and playback software (MEPS).<sup>1</sup> Composers born after 1975,<sup>2</sup> who had access to these programs from the very beginning of their careers as young student composers are more likely to use MEPS as a *compositional* tool, composing directly on the computer, making extensive use of a program’s compositional utilities, and assessing their work through trial and error by listening to the computer’s playback. Meanwhile, the generation that learned the craft of composition before the

availability of MEPS is more likely to limit itself to using MEPS as a means of printing clean, professional-looking scores.

This shift in compositional practice toward relying on computer tools and playback marks an entrance into uncharted territory, and raises questions regarding its potential pitfalls. Most notably, critics blame the poor quality of a composition on the overuse of the cut-and-paste function, or the inadequacy of the computer playback. Such pitfalls would affect in particular inexperienced composers who do not have extraneous training, but they may also influence more experienced composers (whether or not they are conscious of this influence).

This paper aims to list and discuss the ways in which the compositional utilities of MEPS can have a detrimental effect on the quality of the music being composed, and what strategies might be implemented to diminish these effects. While MEPS has indeed the potential to limit options or steer the compositional process, interviews of composition teachers reveal that music produced using MEPS is just as aesthetically valid and effective as other music, showing either that users are able to circumvent the issues, or that the influence of the computer is not aesthetically detrimental.

## I. Two Approaches

Chris Watson's 2006 dissertation *The Effects of Music Notation Software on Compositional Practices and Outcomes* offers the first comprehensive study on the effects that MEPS has on the music of composers who use it as an integral part of their process.<sup>3</sup> This paper will complement Watson's study with a more informal one carried out at the University of Southern California in the Fall of 2007. The similarity of our

findings leads me to believe that the portrait drawn by Watson of the use and effect of notation software in New Zealand can be readily applied to the United States.<sup>4</sup>

As Watson points out, such studies have been rare. Yet, they are likely to be particularly useful to young composers who are increasingly reliant on music engraving and playback software such as Finale and Sibelius to compose, and are most likely to overlook ways in which the program directs and constrains their writing.

Apart from Watson's dissertation, this topic had been the subject of the online magazine *New Music Box* in August 2002, which featured accounts by six established composers on the matter, showcasing the variety of their approaches.<sup>5</sup> Two of them, Gloria Coates (b. 1938) and Jerome Kitzke (b. 1955), do not use a computer to compose, preferring paper and pencil. Mary Ellen Childs (b. 1957) also composes with paper and pencil, but likes to input her music in the computer, printing a professional-looking score of her piece in progress once a day. Walter Thompson (b. 1952) also uses Finale to notate his music, but and despite his positive tone, it is quite clear from his score examples (and ultimately his narrative) that Finale is not an adequate tool for his purposes.<sup>6</sup> Robert Morris (b. 1943) writes a lengthy history of music software that shows a great deal of awareness of the quirks of the different programs he has used throughout his career. He only listens to playback to detect copying errors. Writing about the software available around 1990, he notes: "The possibility of playing computer-copied scores electronically via MIDI did not impress [composers] either, for part of a composer's training is to hear music internally by reading a score."<sup>7</sup>

The only composer in the set who appears to use playback, Joseph Pehrson (b. 1950), expends a lot of energy coaxing micro-tonal sounds out of the computer. He

also works hard at making the program yield the notation he desires. Composers of this generation do not *interact* with the program: they do not make compositional decisions based on the feedback they get from the computer, and they will not let themselves be influenced by the difficulties inherent to obtaining a particular sound or notation. Such composers experience the computer as a tool destined to *serve* ideas obtained entirely *independently* from the computer. The computer may not influence or otherwise contribute to the compositional process. Such composers will enforce their concept even if it requires delving deep into arcane functionalities of the software, and coaxing the desired result from it at great expense of time and energy.

Meanwhile, Chris Watson (b. 1976), who analyzes and describes his own process in great detail in his dissertation, belongs to a different generation of composers (born 20 years after the youngest composer featured in the *NewMusicBox* survey). For him, as well as for the composers currently studying at USC (born, generally speaking, between 1975 and 1990), the use of the computer is common. For many in that generation, the use of playback is central.<sup>8</sup> One of my interviewees at USC, whose process involves a great deal of sketching away from the computer describes the value of playback as follows:

The one thing I find [Sibelius] useful for compositionally is to figure out timings. In one's head or at the piano it can be hard to figure out how long an idea is or should be, and having the computer take you through the music in real time can be helpful.<sup>9</sup>

While this marks a clear departure from Morris's vision of trained composers hearing scores internally and, presumably, judging timings in their heads, this student is in fact conservative when compared to my other interviewees.<sup>10</sup> Much like Watson who describes his use of playback as obsessive, another USC student explains:

I never sketch at the piano. I find that I sketch away from the computer less and less. I will admit that I have become addicted to the instantaneous feedback that MIDI and computers make available.

Such an account is in fact quite typical. Younger composers now compose directly on the computer, rely on and react to playback, interact with the computer, sometimes choosing to surrender to what the software does naturally, sometimes choosing to fight for a given result.

Before we discuss the opinions of composers on the influence of these programs, let's review what MEPS can and cannot do, and discuss the effects of the limitations on composers. While limitations are most likely to affect novices, they can also influence experienced users who are pressed for time. Finally, some musical ideas are outright impossible to notate or play back at this point, using MEPS.<sup>11</sup> Watson mentions that Sibelius is the most widely used program in New Zealand. According to the composition faculty at the time of my study, Finale was more widely used at USC. Thus, the following study centers on Finale, but tends to be applicable to both programs.<sup>12</sup>

## II. Issues with MEPS

### **1. A brief look at the advantages of MEPS**

The three major *compositional* functions of Finale are MIDI piano keyboard input, logical functions (such as cut and paste, transpose, or undo), and playback. By comparison to paper and pencil, Finale makes certain processes such as cutting and pasting phenomenally easy. The insertion of new measures in the middle of a passage is now painless,<sup>13</sup> and the transposition of an entire piece can take just a second when it would have formerly taken hours. Composers no longer need to imagine all the parts in their heads or to play them on an instrument (such as the piano), as Finale enables them to hear texturally complicated music and to quickly complete operations that formerly

required a great deal more time to perform. For instance, with Finale, it is now easy to move an entire line over by a quarter note. Composers are no longer required to be able to play the music; Finale will play back a passage using a timbre that is close to that of the desired instrument, and Finale will play it at performance speed. Most of the notation work is done during the composition process (no need to make a “fair copy”). My interviewees all contend that these pros by far outweigh the cons we are about to discuss. Indeed, by removing many of the cumbersome aspects involved in composing music by using paper and pencil, composers can devote more of their time and energy to perfecting their music, and to operate edits that composers of previous generations might have shied away from undertaking.<sup>14</sup> Yet, the list of cons is far from negligible, and I will not be talking here about program glitches, although unfortunately, new types of these appear with each new version.

## **2. Hardware Issues**

When Finale users input music through a *MIDI piano keyboard*, instead of using other available input methods (such as mouse point-and-click or computer keyboard), the setup encourages the composer to improvise at the keyboard while composing, and can lead to pianistic scorings and gestures, even when composers are writing for instruments that are unrelated to the piano. By incorporating the piano for MIDI input, Finale acquires all of the baggage of criticism that had been thrust at the piano (i.e., the composer favors pianistic chord spacings or pianistic gestures when composing for other instruments than the piano).<sup>15</sup> Moreover, the keyboards used for MIDI input are often smaller than the full 88-key piano keyboard; the smaller the keyboard, the more the user will need to go through extra steps in order to notate pitches outside of the little keyboard’s range.

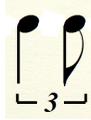
*Computer screens* tend to be too small or to lack the resolution of a sheet of paper.<sup>16</sup> For instance, it is impossible on current screens to see an entire orchestral score at once, legibly.<sup>17</sup> Physically handling paper remains clearer and more intuitive than clicking on a zoom button. Moreover, MEPS programs still do not allow one to simultaneously display pages that are not adjacent. Display problems also make it difficult for the composer to visually keep track of what is going on in an instrument which does not have a staff nearby.<sup>18</sup> Because of the isolation of the “zoomed in” mode and the impracticality of temporarily migrating to a different part of the score, it is easier for the user to rely on the playback and to devise or alter counterpoint from *hearing* the context, rather than *seeing* it. While printing the score can be a useful remedy, the score only represents a snapshot of the piece at a given point in the process. Since the computer file contains the latest modifications and additions, composers may need to print new versions very frequently to ensure they are working off of current information, a process which could become overly cumbersome.

### **3. Notation Issues**

Even though Finale is technically capable of printing *complex scores* that involve a great deal of graphics and 20<sup>th</sup> century extended notation, this is so “non-idiomatic” and time-consuming that a composer may save time by handwriting the score. Ultimately, some scores are completely beyond Finale’s capabilities. The difficulties even extend to some exceedingly *basic functions* such as the notation of triplets or the changing of meters. Notating either of these requires an amount of time and effort disproportionate with their currency, and is frustratingly complex when compared to how easy it is to

indicate them by handwriting.<sup>19</sup> Such a simple rhythmic figure as the one in Figure 1 requires an odd, unintuitive additional step.

**Figure 1: A simple rhythmic figure.**



After telling the program that one wants to input a triplet of some kind, one has to input the first pitch as an eighth note, and *then change it* to a quarter note.<sup>20</sup>

When faced with having to input a large number of these, we shouldn't be surprised if a composer consciously or subconsciously avoids the use of this rhythm. In fact, precisely because of this, if a piece is to include roughly the same amount of triplet rhythms as duplet rhythms, and alternate between them frequently, a composer would save time by choosing 6/8 as the meter. Thus, instead of the 2/4 passage shown in Figure 2.a, a Finale-using composer might prefer to write the same passage in 6/8, and use the dot (very convenient to input in Finale – just press the period key) when a duplet is needed (Figure 2.b). Performers, however, find this sort of notation to be more confusing, and, if 6/8 is necessary, would prefer to see a duplet (Figure 2.c), which is by far the most cumbersome to notate using Finale!<sup>21</sup>

**Figure 2: Three ways of notating the same melody.**



#### 4. Playback issues

MEPS is notoriously inaccurate (and thus inadequate) in closely imitating a live performance by human players. Among the issues with playback, until recently, Finale had a *limited array of timbres* and involved MIDI sound banks that sought to imitate the sounds of a selection of instruments, through synthesis (as opposed to sampling). More recently, Finale comes bundled with a far more realistic sound bank (Garritan Personal Orchestra). Very realistic sound banks (e.g. Vienna Symphonic Library) are also available separately, for several thousands of dollars.<sup>22</sup> Even if a composer can afford to purchase these, the sounds remain limited to traditional orchestral instruments, playing in traditional ways. Composers interested in writing for an instrument that doesn't belong to this bank would have to either record samples of their own, or find, among the patches that are available, the one that sounds most similar to the real instrument. In addition, the sound banks cannot be comprehensive in their coverage of extended techniques (e.g. multiphonics), as performers are constantly on the lookout for ways of coaxing sounds from their instrument. Finally, sound banks are still utterly unable to simulate a human voice or a choir singing words.<sup>23</sup>

Percussionists are in charge of an ever-growing arsenal of instruments, including for instance custom-made instruments such as Xenakis's *sixxen*,<sup>24</sup> built from other objects bought in hardware stores or collected in junkyards. A composer such as Kathryn Alexander (b. 1955) was so eager to hear these sounds as she was composing that she actually recorded a patch for each of the non-standard instruments she was using.<sup>25</sup> Such a time-consuming, uncompromising, and patient approach is characteristic of the veteran

composer, constantly questioning the process and technology, and finding ways of extracting what is needed. Younger composers are less likely to undertake such extreme remedies. (It is not so much a matter of laziness as much as a difference in approach, as explained above.) Generally speaking, even if Finale does provide a patch for the instrument, it *does not provide the variety of sound* that can be obtained on one given pitch (variations due to changes in embouchure on a wind instrument, for instance, or variations due to alternate fingerings). Even with relatively good sound banks, the computer *does not faithfully reproduce a performance with human players*, who will for instance adjust their intonation to a given harmonic context. Composers who use the less optimal sound banks may become convinced that certain instruments (e.g. strings) or combinations are undesirable, based solely on the computer playback, when an actual performance would prove perfectly acceptable. Since slower tempos focus the composer's attention on the sound (which tends to be ugly), composers are wont to avoid slow and texturally thin music. As Chris Watson explains, the dry nature of early MIDI sounds caused composers to want to fill the void with a lot of activity.<sup>26</sup> This resulted in busy textures and excessively fast tempos. This problem is greatly reduced now that sounds are closer to those of real instruments.

Finale may also mislead the composer by inaccurately depicting the relative balance of each instrument. Finale will willingly play back *superhuman gestures* that performers have a great difficulty playing, or cannot achieve whatsoever. Beginning users, for instance, may not realize that instrumental ranges are limited, or that they do not correspond exactly to the range of the keyboard they happen to be using. In the less optimal sound banks, instruments are programmed to produce a sound throughout the

entire range of the piano. This could be partly due to the fact that a particular patch might be intended to simulate a whole family of instruments (from bass flute all the way up to piccolo, for instance). But an inexperienced user may be misled into believing that the flute can in fact reach several octaves below middle C! More recent programs address this issue automatically in two ways. The patch can be designed such that notes are only available on pitches that a real instrument can play. Sibelius warns users when they are about to input a note that lies beyond the range of an instrument. While Finale does include a plug-in that allows users to check the range of each line, this implies inaccurately that instruments have a finite and constant range, whereas this varies from player to player and across different models of the instrument (mouthpiece, reed, etc.).<sup>27</sup>

Range is an easy problem for a computer programmer to remedy when compared to the following, blurrier issues. Finale is not, as of yet, aware of what constitutes a difficult or impossible trill on any given instrument. Finale will not detect music that exceeds reasonable performance speeds. Finale cannot keep track of how much air is left in a performer's lungs and happily plays back notes indefinitely, even in wind parts. The lips of Finale's brass patches never tire. The pianist in Finale's playback can play 30-key chords if desired.<sup>28</sup> Lastly, Finale will ungrudgingly calculate and perform any rhythm, even if its complexity would baffle the most seasoned human performer.

*Inability to correctly interpret notation for playback.* Percussion notation is non-standardized (by comparison to, say, the violin), and essentially needs to be redefined or at least clarified at the beginning (or in the course) of each new piece. Getting Finale to simultaneously notate and perform percussion music accurately can prove a challenge.

Users often forgo trying to get Finale to play back the percussion part, or create two different files: one that looks right and one that imitates sounds accurately.<sup>29</sup>

Finale's difficulties with simultaneously notating and playing back percussion apply to all 20<sup>th</sup> century unconventional notations, for which, once again, users are well advised to forgo hearing playback.<sup>30</sup> While MIDI can perform pitch alterations relatively easily, Finale cannot easily be used for the writing of pieces outside of the standard equally tempered, 12-note tuning system.<sup>31</sup> Finale is currently incapable of playing back scores that call for even the most basic and controlled forms of improvisation (such as, for instance, figured bass, or jazz charts).

*Stereo bias.* Because the majority of computers are equipped with standard stereo output devices, Finale is designed for stereo output. Recent versions of Finale now allow the user to assign instruments a given position on the stereo spectrum, but beyond stereo, it is unable to convey spatial placement (which would also, incidentally, require the user to have a studio equipped with at least a "quad" loudspeaker setup). Composers unaware of this bias may overlook the potential of spatial arrangements easily implemented in live situations. Loudspeakers and headphones do not correspond very closely to a live performance anyway, rendering sounds in an altogether different way.

*Expressiveness.* Finale is particularly clumsy at making its playback sound musical. Composers, who want the program to perform a convincing accelerando, ritardando, or sudden shift in tempo, should be prepared to program every minute tempo variation into the music. Otherwise, the program is left to guess, for instance, the extent of the ritard. While recent versions of Finale include a "human playback" function, the effect still remains, unfortunately, mostly inhuman (that is, rather mechanical).

## 5. Other technical issues

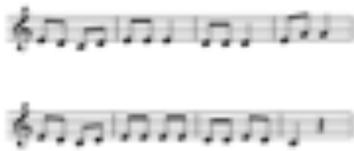
Any of the problems already mentioned can be misleading to beginning students. We can list two more issues in addition. *Enharmonic Spelling*: students may not know enough about notation to understand that the computer's default notation might be incorrect. For instance, since the computer is, as of yet, incapable of determining the key of a given passage, it is concurrently unable to choose the appropriate enharmonic spelling.<sup>32</sup> A student cannot learn such grammatical fine points from using Finale. Formerly, a student would have spent more time learning notational conventions from studying scores or theory books. Since Finale now makes many of these decisions automatically, the student may not be aware that the computer is merely implementing a default which may not be appropriate for the particular situation. Such spelling and "grammatical" issues are covered in theory classes. Composition teachers also give them foremost priority in lessons, since, much like writing English, errors smack of ignorance and are detrimental to the reception of the work.

*Hyperscribe*: Finale comes equipped with an automatic notation (hyperscribe) feature that purports to notate music as the user plays it on the keyboard. To help the computer out, users must line up their performance with preset metronome clicks. Unless the user has set up a tempo and metric grid in advance, the computer is unable to correctly interpret music with such features as ritardandi or metric shifts. More problems dog the program within a given measure, where it can prove woefully inaccurate. If quantization settings are set too finely, the computer becomes too sensitive to human error (or, indeed, intentional minute performance variations<sup>33</sup>) and notates rhythms that are far more complex than those that are intended (Figure 3.b). Conversely, if the

quantization is set too coarsely, the program will be prone to simplify rhythms. In Figure 3.c., this is due to the fact that Finale cannot fit an even string of eighth notes within a grid that isn't any finer than the quarter note level. It will clump all the notes occurring within the duration of the quarter note into a chord.

Figure 3: "Mary had a little lamb."

a. Desired notation.



b. Notation resulting from an excessively **fine** quantization setting.



c. Notation resulting from an excessively **coarse** quantization setting.



This can be misleading or confusing to students unfamiliar with notation as well as those who trust the tool and do not double check the computer's notation. With other sequencing programs (such as Digital Performer) already transcribing with better results than Finale, one can expect that Finale will follow suit, and that composers will use the hyperscribe function increasingly.

## 6. Aesthetic Risks

Beyond these more technical issues, we can list five over-arching risks.

*Compromises:* Educators worry that, consciously or not, the students will gravitate toward writing music that the program notates and plays back with ease, and away from what the program has difficulty handling. All of my interviewees acknowledge that they are often tempted to compromise, and that, occasionally, they surrender in the interest of time or out of sheer frustration.

*Short-sightedness, sheltering, and uniformization.* Composition teachers worry about something more insidious than compromises. They worry about the options, the possibilities that students will never become aware of because of the program's assumptions. The program's tools and menus attest to a myriad of options that inquisitive students will be keen to experiment. It is what the program doesn't offer, which is perhaps the most dangerous.

A default Finale document implies a number of assumptions. For instance, Finale automatically assumes that each new measure is in the same key and same meter as the one which preceded it. Were the program set up to ask users to confirm the meter every time a new measure is added, users might experiment with this aspect, instead of composing a whole piece in the default 4/4 meter.

Thanks to the cut-and-paste function, a piece can be built of exactly identical building blocks (from bar to bar, and/or from section to section). (Many of my interviewees brought up the fact that Finale's cut and paste function was ideally suited to the repetitive textures of minimalism, although they also acknowledge that the style was in full swing long before Finale's heyday). In other words, Finale encourages a sort of

*uniformity* that is rather antithetical to the explosion in possibilities witnessed in Western classical music just a few decades ago.

*Shift of goals.* For the composer, while the first live reading of a piece, the rehearsal process, and the performance can be enjoyable, these phases are often short, nerve-wracking, and sometimes quite discouraging. Performances often occur months after the composition process is completed. As these phases become less significant and less rewarding to the composer, the importance of MEPS playback grows in inverse proportion, becoming the more meaningful and rewarding event. It can be difficult for the composer to favor a distantly scheduled live performance, where vaguely-imagined and hopefully well-calculated effects will finally become tangible, over the immediate reward of the computer's feedback. However, if a composer produces a score that, while it lends itself to compelling computer playback, overlooks legibility and playability, rehearsals are likely to reinforce the composer's notion that human performers are inadequate. They might even encourage the composer to switch over to producing computer music exclusively.

*Resistance to migration.* Because Finale is a complex program that requires a lot of time to master and use fluently, veteran users may become increasingly unwilling to migrate to different programs.<sup>34</sup> They might also lose sight of the fact that there are entirely different ways of composing music.

*Risk that the computer will supplant the composer.* Finale has recently added new tools that auto-harmonize music, auto-arrange, and auto-orchestrate. A Finale manual describes them as follows:

[The] Composer's Assistant plug-ins ... are specifically designed to help generate musical ideas. These tools won't write a piece for you, but they will analyze existing music and offer

suggestions for chords, rhythms and voicing. If you are looking to generate harmony for a melodic passage, Finale can offer a large number of suggestions for up to six parts with the Band-in-a-Box Auto Harmonizer plug-in. You can even create an entire jazz accompaniment for any melody with the MiBAC Jazz Rhythm Section Generator plug-in. Finally, if you are composing serial music, or a related genre, you can easily rearrange notes by inversion or retrograde with the Canonic Utilities.<sup>35</sup>

Meanwhile its competitor, Sibelius, proposes something very similar:

The Arrange feature is an extremely powerful tool to create music in the ensemble of your choice. ...  
The Sibelius Arrange feature is able to reproduce ensemble voicings made famous by Sammy Nestico, the Count Basie Orchestra, and others.<sup>36</sup>

The writer concedes that the program “will not harmonize your music, realize chord symbols, add counter lines, substitute chords, or remove the need to study those subjects further if you need to use them.”<sup>37</sup> Evidently, we can only imagine that Sibelius software programmers are hard at work developing those particular plug-ins.

The effectiveness of these tools is currently limited, and they result in unimaginative arrangements. With time, however, there is no reason to believe that programmers cannot find a way of improving their product. When can we expect Finale to have an auto-compose function? As the computer makes more and more decisions, users are at risk of letting their skills atrophy. Literally speaking, however, the computer isn't truly making creative decisions either, as those are dictated by software engineers. As such, the future for composers might be, precisely, as the masterminds behind composition software.<sup>38</sup>

## **7. Stigma?**

I mentioned earlier the somewhat dogmatic misgivings of some composers with regard to the use of MEPS. Yet, composers also need to contend with the views of the

general public on the matter. A professional composer interviewed in connection with this project explained: “I am *frequently* asked about my process in interviews, and to what extent I employ the computer. I *do* downplay it.” Why is this necessary? Laymen, steeped in the familiar idea of composer as genius, following the model of Beethoven, may disapprove of composers using computers. For instance, they may perceive the computer to be an unnatural intermediary between the composer and the music. They may worry that the computer is doing all the work and the composers are “cheaters.” Composers can thank Milton Babbitt for the right to treat laymen’s qualms as utterly inconsequential.<sup>39</sup> Why would professionals have to answer to people whose knowledge of music is fraught by deep misconceptions and a severe lack of exposure? Nevertheless, when composers are in the presence of laymen, they may seek to downplay that aspect of their process and bask in the laymen’s grandiose assumptions about the truly superhuman nature of the composer, endowed with a divine gift and an array of prodigious musical powers such as the ability to play every single instrument (otherwise, how could one compose for it?) or the ability to internally hear complex orchestral music from looking at a score, exactly as if it had been played on a recording by the New York Philharmonic.

### III. Defensive Composing Strategies

Composers are not keen to abandon Finale (or their specific MEPS) on account of this impressive list of potential pitfalls. Yet, as the program threatens their effectiveness and originality, users (beginners in particular) would likely welcome a number of strategies to prevent any major adverse effects.

Developing a reasonably detailed awareness of the issues, as discovered and explained by previous users, should be the primordial step. The second step is to remain

on the lookout, constantly questioning decisions the computer makes automatically. Users should also constantly monitor their own decision process, assessing to what degree they are making compromises.

After becoming conscious of the compromises, users should take the time to achieve their original goal, to literally fight the program or to take the time to “manually” implement all of the steps required by their concept. In this, they can take heart from their teachers’ accounts of processes that took weeks and months of work to complete, for a mere minute of music. They need to remember that the composition process is generally time-consuming, that certain passages may suddenly require an unexpected amount of work to complete, and that composing must be approached with patience. At the same time, if the computer proves to be too much of an impediment, users should be prepared to move on to different software, or, if necessary for a given project, to move away from the computer altogether.

This is more easily done when the composer is proficient at composing with more than one tool. Staying on the lookout for other (both newer and older) tools and processes, keeps the composer’s brain flexible, ready to migrate and to adopt new tools. Even if a given tool doesn’t prove useful at the time, it might introduce the composer to a set of approaches that will form the basis of a program that will become useful. At any given point, a composer should be integrating MEPS amid other composing processes. This will help spread the risk of dependency and error. One of the students I interviewed describes using a variety of approaches when composing a piece:

I generally start at the piano, which is where I work through ideas, especially harmonic ideas. After a certain point I need to get away from the piano to get a more developed perspective on the piece. I might do some sketches on paper (which can be very specific or very abstract) or walk around and think about the piece (for some reason, walking is

important). At a certain point I have an array of ideas substantial enough to go to the computer and start inputting things in, though the computer often comes into play earlier, especially if I am in a hurry. In fact, the ideal process I just described hardly ever happens just like that, and in practice there's a lot of jumping back and forth between different parts of the process.

He acknowledges being occasionally tempted to take certain shortcuts because the alternative would go against the grain of the program. When that happens, he writes, "I step back and sketch things on paper."

Composers should be clear about their goals. If playback from their MEPS is their final stage, and they intend to produce music that is fully synthesized, then they are entitled to ignore all the conventions that performers require; they can ignore all issues of playability and legibility. If, however, a live performance is the end product, the use of MEPS playback must be viewed critically and each part constantly analyzed from the point of view of a live performer. To help with this, composers should meet with a performer ahead of the first rehearsal, to ensure that each individual part is performable.

Teachers have implemented different ways of forcing their students to avoid the pitfalls associated with the cut and paste function. Some forbid its use entirely, demanding that, if students truly believe they want the same exact material to recur, they actually go through the process of re-inputting it into the computer. Most often, teachers contend, students will take this opportunity to make variations, which will benefit the piece. Other instructors allow its use but urge students to keep track of the copied material and to treat it as a temporary textural placeholder that eventually needs to be reexamined and most likely changed.

If composers expose themselves to all kinds of music, listening to new pieces and looking at scores, they will naturally discover processes and vocabulary that they may

want to include in their own work. Such an exposure can highlight issues with their current process and bring it to their awareness.

According to students I interviewed, professors may caution their undergraduates against certain pitfalls, occasionally requesting that students wean themselves, at least temporarily, from their computer, and switch to writing their scores by hand. One of my students interviewees described his experience as follows:

Teachers ... will say that [composing with Finale] is something that should be done only when one is an accomplished master (as all composition teachers fancy themselves) and has the critical apparatus in place to supercede the limitations of notational programs.

So teachers tend to frown on undergrads doing it, but since becoming a graduate student I've never had a teacher who had a problem with my doing it.

In fact, according to the teachers I interviewed, there is usually no need to address this issue with their students after the first couple of years.<sup>40</sup>

#### IV. Comforting Perspectives

My faculty interviewees explained they do not tend to find major MEPS-induced problems in their students' music, and they were generally skeptical that MEPS could induce negative effects of any magnitude. Thus, it is perhaps not surprising that students and professors both felt that the term "stigma" was too strong to describe the misgivings held by professionals and laymen against a composer's use of MEPS. They acknowledged the existence of teachers who issue dire condemnations, but portrayed these as isolated cases.<sup>41</sup>

One of the professors acknowledged feeling a sort of Romantic attitude with regard to technology, describing the computer as "the gothic cathedral" of the present day, implying that, while computers may still be in their infancy, they are likely to be

perfected over time into a truly transcendent object. Indeed, since the inception of MEPS, engineers have been constantly adding new functionalities, perfecting the programs and trying to find ways of minimizing and eliminating shortcomings. It is difficult to predict which of the issues listed here will still be present in the program a few years hence.

A different faculty member also gave a historical perspective on MEPS, pointing out that:

[For] composers who maintained positions with orchestras, ensembles, choirs, churches, etc., ... quick feedback (audio feedback) on their ideas was a normal part of their procedure. Composers in the 19<sup>th</sup> century and prior *heard* much more of their music on a regular basis, and benefited from it. Is Finale/Sibelius not simply the restoration of a practice dissolved by the economic constraints of the 20th century, and the resultant limited access to performers?

While a look at traditional compositional practices would involve a study that would exceed the space limitations for this paper, the answer to this rhetorical question, is, evidently, yes. And thus, in this way too, MEPS are to contemporary composers what gothic cathedrals (and their choirs) were to the composers of the Notre Dame school.

A method that is in complete contradiction with the remedies described above involves developing a catalogue of compositional strategies that are MEPS-friendly. Instead of fighting the program and viewing it with constant suspicion, changing over to an outlook of interaction and symbiosis might prove quite fruitful. While tedium can force us to surrender and accept certain limitations, it can also spur us toward the creation of new tools. Some Finale users such as Robert Patterson, whom Johnson describes as a “third-party plug-in developer,”<sup>42</sup> have in fact contributed code to simplify or enable certain functions. More importantly, however, surrendering to severe limitations still does not preclude the possibility of composing masterpieces. In fact, composers often speak of their need for limitations in order to compose. Even if we were to take the most

conservative and limiting view of these programs – that is, that they would be *only* suited for the composition of music such as hymns and lead sheets, and we have a composer who (whether or not s/he does this consciously) refuses to figure out how to get the program to change meters, change keys, change tempi, or do anything that goes beyond the program’s default setting, all this still does not literally preclude the possibility of a masterwork being produced. It doesn’t even preclude the possibility of originality.<sup>43</sup> All of the misgivings mentioned above, while numerous, do not restrict composers so much so that they prevent them from expressing themselves and from producing music that they and their listeners find satisfactory.

Finally, one of my interviewees urged me to put this matter in perspective, stressing that, in the grand scheme of things, much more powerful forces face composers than the idiosyncrasies of their notation software. First, thanks to recordings and means of dispersal (radio, television, internet), composers nowadays find themselves “competing with all the composers that ever lived” in ways that had never happened before this era.<sup>44</sup> Secondly, a composer’s career is greatly dependent on political forces within both music and academia.<sup>45</sup> Evidently, such dynamics truly exert a great deal of influence on composers. Unlike the issues we brought up with Finale that will shape a composer’s music inadvertently, the powers of academia and the powers of commerce *demand* music of a certain type. It is not surprising that, throughout history, some of the most creative composers did not make it their profession (Charles Ives, the insurance man, epitomizes the figure of the American maverick composer).

With the issues inherent to MEPS now clearly delineated and remedial strategies laid out, it is my hope that this article can enable composers to approach MEPS with a

greater sense of awareness and control, and that it can serve to diffuse the notion that pieces composed using MEPS cannot escape being irremediably flawed. Let us not let our anxieties about the quirks of our MEPS become overblown, lest we forget that they are mere eddies by comparison to the currents and whirlpools of mass culture, fashion, politics, and, ultimately, money.

## BIBLIOGRAPHY

Babbitt, Milton. "Who Cares if you Listen?" in *Contemporary Composers on Contemporary Music*, Elliott Schwartz, Barney Childs and James Fox, eds. Cambridge, MA: Da Capo Press, 1998.

Friberg, Anders, and Giovanni Umberto Battel. "Structural Communication." In *The Science & Psychology of Music Performance*, edited by Richard Parncutt and Gary McPherson. Oxford: Oxford University Press, 2002.

Johnson, Mark. *Finale* ® 2005 *POWER!* Boston, MA: Thomson Course Technology, 2004.

Rudolph, Thomas E. *Sibelius: a comprehensive guide to Sibelius music notation software*. Milwaukee, WI: Hal Leonard Corp., 2007.

Oteri, Frank J., ed. "How does using music notation software affect your music?" *NewMusicBox*, August 1, 2002. <http://newmusicbox.com/article.nmbx?id=1810>

Watson, Chris. *The Effects of Music Notation Software on Compositional Practices and Outcomes*. Ph. D. Diss. Victoria University of Wellington, 2006.  
[http://www.chriswatsoncomposer.com/chris\\_watson\\_phd.pdf](http://www.chriswatsoncomposer.com/chris_watson_phd.pdf)

## ENDNOTES:

---

<sup>1</sup> In his 2006 dissertation, *The Effects of Music Notation Software on Compositional Practices and Outcomes*, Chris Watson uses the acronym MNS (music notation software). For all intents and purposes, MNS and MEPS (music engraving and playback software) refer to the same thing (software such as Finale and Sibelius), but I believe that it is crucial to underscore two points. 1) “*Notation*” versus “*Engraving*.” These programs are designed principally for the production of scores of *Western classical music* (with all of the rather specific assumptions and conventions this implies: time being represented from left-to-right, pitches of lesser frequency being notated lower on the page than those of greater frequency, octaves being divided in 12 even intervals, meters subdividing in powers of two, and so on). For that reason, the term “engraving,” which I believe evokes this particular apparatus, seems more appropriate than the vaguer term “notation.” “Engraving” accounts well for the struggles faced by composers who wish to break any these conventions when using these programs to notate their music, struggles they would most certainly not face, were they composing with pen and pencil. 2) “*Playback*.” For many composers, the *playback function* is a vital function of these programs. It is a feature of equal if not greater importance than the ease of cut-and-paste, transposition, or the ability to print professional-looking scores.

<sup>2</sup> In other words, composers who would have been 15 years old or younger in 1990, when MEPS first became available.

<sup>3</sup> Chris Watson, *The Effects of Music Notation Software on Compositional Practices and Outcomes*. Ph. D. Diss. Victoria University of Wellington, 2006. Available online at <[http://www.chriswatsoncomposer.com/chris\\_watson\\_phd.pdf](http://www.chriswatsoncomposer.com/chris_watson_phd.pdf)>

<sup>4</sup> For his study, Watson sent a lengthy questionnaire to all of the composers currently active in New Zealand which he then analyzes in a careful, scientific manner. My study is based on interviews of a far smaller sample: two professors and five students. (Watson’s study doesn’t include students.) My conclusions are based on their observations as well as my own experience composing music using Finale.

<sup>5</sup> Frank J. Oteri, ed. “How does using music notation software affect your music?” *NewMusicBox*, August 1, 2002. Available online at <<http://newmusicbox.com/article.nmbx?id=1810>>

<sup>6</sup> In the same collection of responses, composer Robert Morris describes a program called NoteWriter, which seems far more suited to Thompson’s goals.

<sup>7</sup> Robert Morris, “How does using music notation software affect your music?,” *NewMusicBox*, August 1, 2002. Available online at <<http://newmusicbox.com/page.nmbx?id=40hf04>> As one of this paper’s reviewers pointed out, MEPS implicitly shares a bias held by an older generation of academic (/modernist) composers, whereby all the elements of the music in performance are assumed to be *fully predictable* (i.e. they can be fully imagined by the composer) from the written page. For such composers, any form of computer playback would be at best redundant, at worse inaccurate and misleading. The severe limitations inherent to early playback (most notably the poor rendition of timbre and dynamics) added fuel to this negative opinion.

<sup>8</sup> That is not to say, however, that these younger composers only use one computer program or have discarded pencil and paper altogether. Many young composers still compose music by hand, and when their music does not lend itself to being easily copied into Finale (and when Finale would not be able to play it back properly anyway), they see little advantage in spending time doing so. My interviewees also use a variety of computer programs besides MEPS, including recording and sequencing software such as Digital Performer, or software such as MAX.

<sup>9</sup> Given the candid nature of some of the comments quoted in this paper, the participants in my study will remain anonymous.

<sup>10</sup> Regarding the ability to hear scores in one’s head, one of the comments I received seems very pertinent and deserves mention here: “I know of a few composers who think that composing at the piano or computer is bad because we should ‘hear it in our heads’ but they’re few and far between. It seems to me that most of the composers who say these types of things tend to write either tonal, largely homophonic music which is relatively easy to imagine without any other tools on hand, or very conceptual music. Since I don’t like being limited to those options, I tend not to listen to their advice.”

<sup>11</sup> For instance, at this point, Finale/Sibelius simply cannot produce Braille musical notation, and it cannot play back vocal scores, or improvisatory scores. These are, for all intents and purposes, unachievable using these programs.

---

<sup>12</sup> Since Finale issues a new version of the program every year, perhaps it is useful to mention that the version the author is currently using and is familiar with is Finale 2006.

<sup>13</sup> Composers who only use pen and pencil need to leave a lot of space on their scores to manage for potential insertions. If that space becomes used up, they need to literally cut up their score, and/or paste flaps of staff paper, or simply copy out a brand new page.

<sup>14</sup> Chris Watson's research indicates, however, that this hasn't enabled composers to be more prolific. Instead, they spend more time focusing on other aspects, such as weighing competing options using the playback function. (Watson, 69 and 116.)

<sup>15</sup> There are other MIDI instruments in existence, such as MIDI guitar or MIDI violin. These are comparatively much rarer than MIDI keyboard, but they could conceivably be used to input music into Finale, and similar issues would apply (e.g., guitar-like chord spacings, violin-like gestures). Finale also has the ability to "listen" to a non-MIDI, single line instrument (e.g. a saxophone, but not a guitar) as it plays into the computer's microphone. Finale attempts to determine pitch and duration, and notates this information on a staff. (Again, the same set of issues could arise here.)

<sup>16</sup> Users must apparently also miss the *look* of paper since more recent version of Finale provide users with a selection of paper textures to use as backgrounds in lieu of the default computer-white.

<sup>17</sup> Just as journalists use portrait monitors (instead of the far more common landscape monitor), nothing technically prevents composers from purchasing display systems that correspond to their needs. Large screens are expensive, however, and composers may not experience the inconvenience to such a degree that they would decide to procure one from themselves.

<sup>18</sup> Say, for instance, the composer is working on a highly polyphonic piece for large orchestra (really not such an exotic proposition). Say the composer wants the first flute part to double that of the violins. In order to cut-and-paste the string music, the composer needs to travel down to the part of the score where the string parts are notated, which involves scrolling through all the woodwinds (12 staff lines), all the brass (11 lines), as well as percussion and harp (7 lines) before finally reaching the violins (30 staff lines in all). If the screen can only legibly accommodate 10 lines, the strings are 4 screens removed from the flutes. If the composer first zooms out, the score is so crunched up that the user can't even tell what the music in the strings is. On paper, the experience is nowhere as cumbersome.

<sup>19</sup> However, Finale does significantly shorten the time required to indicate new time (and key) signatures on a multitude of staves, for instance on an orchestra score.

<sup>20</sup> If one starts by inputting a quarter note, the computer assumes that the desired rhythmic division is three quarter notes in the space of a half note, instead of three eighth notes in the space of two quarters.

<sup>21</sup> Textbooks disagree regarding whether the duplet unit in this case should be the eighth or the quarter. Should the space of a dotted quarter be filled with a duplet containing two quarter notes (as in Figure 2c), or with a duplet containing two eighth notes? The latter appears to have more currency, and Finale is geared toward that solution, making it more difficult to use the quarter-note notation style used here.

<sup>22</sup> The full version of the Vienna Symphonic Library ("Vienna Super Package") is currently listed at 14,980 euros. <<http://vsl.co.at/en/211/442/484/490/305.htm>> (accessed March 9, 2009).

<sup>23</sup> This is likely to change in years to come. Vocaloid currently commercializes sound samples that enable a composer to produce quite convincing backup vocals. (Particularly effective if these vocals remain in the background and an actual human sings the same words, simultaneously in the foreground!)

<sup>24</sup> A metallophone used in Xenakis's percussion piece *Pléiades*.

<sup>25</sup> From a talk Alexander gave at USC, March 2006.

<sup>26</sup> Watson, 181.

<sup>27</sup> The Garritan instrumental patches, unlike earlier patches do not extend beyond the range of an actual instrument. So although a note that lies outside of the range of an instrument can be notated, playback will not emit any sound for that note. This leads to a new potential pitfall. If the composer is not paying attention, he or she may not notice (say, in a complex texture) that certain notes are not sounding. The composer may then print out parts that include these notes, which later results in confusion and lost time at the first rehearsal.

<sup>28</sup> These are of course possible, for instance when pianists use their arms to play clusters. Nonetheless, for a beginner who is not familiar with the piano (or is simply not thinking about how the notation translates into a performance), the playback's willingness to perform may be misleading.

<sup>29</sup> One last example (one that qualifies more as an overlook by programmers and will no doubt soon be remedied): trills can involve either the principal note and that half step or that a whole step above. Finale

---

allows a composer to specify this using the appropriate trill-with-accidental notation. However, the program doesn't take this into account, and alternates between the principal note and the one with the next letter name, using whatever accidentals (or lack thereof) happen to be in the key signature.

<sup>30</sup> Robert Morris wryly remarks that early versions of the program were best suited to notating hymns and lead sheets. Chris Watson claims that the problem persists, "as [Sibelius's] core clients [are] primarily band leaders in the United States." (Watson, 66) This emphasis on marketing the program to music educators is manifest in the features ("Educator Tools" and "Exercise Wizards") that are advertised with each new version, features that composers will not even install on their computer.

<sup>31</sup> Joseph Pehrson argues otherwise, describing how he devised a special font to get Finale to notate his particular microtonal system, then was able to program each symbol to play back properly using pitch bend. I would argue that, like Kathryn Alexander's, this is a very work-intensive approach that even a seasoned user of Finale might be loath to implement.

<sup>32</sup> While computer engineers such as USC's Elaine Chew are currently at work on programs that can detect pitch center, many pieces do not actually lend themselves to a cut and dry analysis of the sort.

<sup>33</sup> Anders Friberg and Giovanni Umberto Battel, "Structural Communication," in *The Science & Psychology of Music Performance*, Richard Parncutt and Gary McPherson, eds. (Oxford: Oxford University Press, 2002), 199.

<sup>34</sup> Watson, however, points to the reverse mechanism whereby composers feel uncomfortable not constantly updating their software to the most recent version, for fear of being left behind. (Watson, 103)

<sup>35</sup> Mark Johnson, *Finale ® 2005 POWER!* (Boston, MA: Thomson Course Technology, 2004), 310.

<sup>36</sup> Thomas E. Rudolph, *Sibelius: a comprehensive guide to Sibelius music notation software* (Milwaukee, WI: Hal Leonard Corp., 2007), 303.

<sup>37</sup> Ibid. 302-303.

<sup>38</sup> In this case, the only difference between a composer and an engineer is the level of remoteness. Perhaps Finale's software engineer and composer can be compared to an architect (at his desk, away from the construction site) and a mason (laying every stone of the building). The place of creativity becomes shifted, but a human creator remains at the center of the process. This very unemotional approach can be perceived as very unsettling and inauthentic. Yet, this is a direction actively explored by modernist composers.

<sup>39</sup> Babbitt famous essay "the composer as specialist." (Milton Babbitt, "Who Cares if you Listen?" in *Contemporary Composers on Contemporary Music*. Elliott Schwartz, Barney Childs and James Fox, eds., Cambridge, MA.: Da Capo Press, 1998, 246.)

<sup>40</sup> One must note, however, that the USC composition department requires students to submit a portfolio when they apply for admission in the undergraduate program. They must therefore have had a number of years of experience prior to the end of high school (during which they most likely already encountered warnings about the use of MEPS from their teachers). Students at other school who may have only started composing in earnest after entering college can therefore expect to receive reminders throughout their entire undergraduate career!

<sup>41</sup> Also see note 10.

<sup>42</sup> Mark Johnson, *Finale ® 2005 POWER!* (Boston, MA: Thomson Course Technology, 2004), 402.

<sup>43</sup> As is frequently pointed out, without even starting to worry about rhythm, there are 12<sup>5</sup> (about a quarter million) possible 5-note melodies to be made from a set of 12 notes. (Indeed, this does include many incidences of melodies that are transpositions of other melodies, but the number remains quite large, and becomes geometrically larger as new parameters are factored in.)

<sup>44</sup> Although, indeed, recordings also demonstrate that one generation's or one population's favorite music may be beyond the appreciation of the audience in a different time or place. So perhaps the competition is not as great as one might at first fear.

<sup>45</sup> Grant-giving organizations and award panels shape a composer's career by providing financial support and performance opportunities. Universities view the prizes, grants, and performances as testimonies of the quality of the composer's work, and base part of their hiring decisions on this. It is thus in a composer's interest to glean as many of these as possible.

Prizes are often decided by panels. The members of the panel base their choices on roughly two factors: (1) intrinsic aesthetic value and (2) the general appeal of the music to laymen (be that potential concert-goers or philanthropists), to ensure sufficient financial income to sustain the whole enterprise.

Panel members tend to be successful composers themselves, meaning that their music was once recognized as worthy by a previous generation of composers. While this presumably ensures a degree of consistency

---

and quality, it also leads to the potential for stylistic bias that shrewd applicants might have the savvy to decode. Once this is determined, the composer can find a way of incorporating the elements required by the judges into a product appealing to laymen (lively, loud and rhythmic often does the trick – and it also serves to make one’s music stand out on the long days and night judges must pore over literally hundred and hundreds of scores, that is, unless everyone else has resorted to the same stratagem).